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STATISTICAL BULLETIN
Metropolitan Life Insurance Co.

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THE VALUE OF A MAN AS A WAGE-EARNER

In previous issues we have discussed the cost of bringing a human being up to the age at which his or her productive career may be supposed to begin. We shall now consider some of the returns from this investment in human capital to determine, if we can, the economic value of the individual at various ages of life. For the present we shall confine our attention to the male population.

To illustrate the principle which we shall follow in making our estimate, let us fix our attention on a group of 100,000 male persons who have arrived at the age of eighteen years. Each year thereafter a certain number will survive, out of the original 100,000, and each year these survivors will earn certain sums of money as wages or salary. They will, at the same time, spend a certain part of this money in the upkeep of their own person—an expenditure unavoidable and necessary to make it possible for them to earn at all.

For example, out of 100,000 males eighteen years old, 94,658 survive to age 30. This is in accord with mortality conditions in the United States in 1924. At this age, according to the United States Census of 1920, 96.3 per cent. of the males were in gainful employment. The class we have chosen for our example in this series is that which, during the period of family raising, has an *average* income of about $2,500. For our present calculations we shall assume that this is also the husband's *maximum* wage or salary. His wage at age 30 would, on a corresponding scale, be $2,225 per annum. The 94,658 survivors, then, earn between the ages of thirty and thirty-one, about 94,658 x .963 x $2,225 = $202,821,300 or, in round numbers, $2,028 per head of the group of 100,000 entering at age eighteen. On the other hand, the cost of living of a male, at age 30, is $583 per annum, in accordance with the schedules set forth in the preceding articles of our series. Thus the 94,658 survivors expend on the necessaries of life for their own per-

son, between ages thirty and thirty-one, a sum of 94,658 x $583 = $55,185,614 or, in round numbers, $552 per head of the original 100,000. We can compute similar terms for income and expenditure, for each year of life above eighteen.

If now we inquire what is the value at age eighteen, of the 100,000 individuals, considered as wage-earners, and in that sense as productive capital, we must, evidently compute the sum of all the terms obtained as above, one term for the net income in the year of life eighteen to nineteen, one for nineteen to twenty, and so on to the end of life, *but discounting each term* at the proper rate of interest, in view of the fact that, at age eighteen, it represents a deferred payment. So, for example, the earnings (and the cost of living, also) at age thirty to thirty-one must be discounted for 30.5 − 18 = 12.5 years, when referred to present age eighteen. As before, we shall reckon interest at three and a half per cent. compounded annually. In the case of the item for the thirtieth year of life, the gross earnings of $2,028, discounted for twelve and a half years, have a present worth of $1,320; similarly, the present worth of the corresponding cost of living ($552) for the same year of life, is $359. Thus the present worth, at age eighteen, of the net income for the thirtieth year of life is $1,320 − $359 = $961.

This computation has been carried out year by year for the several ages of life, with the results set forth in the appended table:

(1)	(2)	(3)	(4)	(5)	PRESENT WORTH AT STATED AGE		
					(6)	(7)	(8)
Age	Survivors l_x	Expectation of Life, e_x	Earnings per Annum w_x	Per Cent. Employed	of Gross Future Earnings	of Gross Future Costs	of Net Future Earnings
18	100,000	46.59	$ 963	78.2	$41,285	$12,631	$28,654
21	98,749	44.16	1,463	88.0	43,398	12,580	30,818
30	94,658	36.87	2,225	96.3	42,623	11,585	31,038
40	89,107	28.84	2,453	97.1	35,933	10,138	25,795
50	80,751	21.28	2,393	95.0	25,900	8,390	17,510
60	67,055	14.53	2,203	87.5	14,920	6,421	8,499
70	44,768	9.04	2,105	60.1	5,008	4,446	562

At age eighteen, which we consider the beginning of the productive period of life, our table shows a present worth of $28,654 for the net future earnings of the average male individual belonging in the $2,500 income class. The present worth of the sum total

of his earnings will be $41,285 according to the scale we have chosen, and the present worth of the expenditures for his upkeep $12,631. At this age, the average individual will have an after-lifetime of 46.6 years. The net value of a person, at this age, belonging to a higher economic class will, of course, be higher because it may be assumed that the cost of upkeep does not rise proportionately with the increase in income. At age 21, when the male individual attains the full rights of citizenship, the net value has increased to $30,818 because, although the expectation of life is now somewhat less, 44.2 years, the annual income, as averaged over the remaining years of life, is proportionately greater. The table indicates the values at consecutive ten-year intervals. Somewhere between the ages of 21 and 30 the value of a man, estimated as the present worth of his net future earnings, reaches a maximum. In this ten-year period the values are nearly constant, because the annual increases in income are largely offset by the higher mortality with advancing age. As will be observed in our table, Column 4, we have assumed a wage scale which reaches its maximum between ages 40 and 50—actually, 43; at which point we have arbitrarily fixed the income at $2,500 per annum. From this maximum the earnings decrease and at the same time the proportion of men actually employed decreases, at first slowly and then, after age 55, very rapidly, to become practically zero at age 80. In this computation we have been largely guided by the data collected by the New York State Factory Investigating Commission, 1915, and the Statistical Department of the Western Electric Company. Data from these two sources were in essential agreement as to the relative amounts of income at the several ages throughout the working-period of life. It is, of course, only with proportions that we are here concerned. The absolute values are determined by our arbitrary figure of $2,500 for the maximum.

In presenting these figures, we have purposely spared the reader the intricacies of the computation. Certain adjustments had to be made, owing to the incompleteness of the data, especially at higher ages. While there is necessarily some uncertainty about these adjustments, it is believed that the figures, as given, represent, on the whole, a correct picture of the facts. The point we wish to stress is the comparatively high value which our computation puts upon the human individual considered as a producing machine, at the various ages. For the first time, to our knowledge, there are presented figures which adequately consider current rates of mortality,

proportion of employment, and prevailing wage scales according to age, for the great mass of productive workers in industrial and mercantile establishments in the United States. These values indicate the immense assets which a country like the United States, with its high standard of living and production, has in its productive citizenship. We shall later wish to consider some of the implications in these high values when we shall discuss the economic importance of maintaining the individual in good health and safeguarding him from premature death.

SMALLPOX IN AMERICAN AND CANADIAN CITIES, 1925

In 747 cities in the United States and Canada, the smallpox case-fatality rate (deaths per 100 cases) in 1925, was 3.1. This may be compared with the rate of 2.5 for the same cities in 1924—an increase of 24 per cent. The 1925 figure is more than five times as high as that shown for 1923, when there were only .6 deaths per 100 cases. The actual number of smallpox cases reported from these cities in 1925 was 15,563, as compared with 23,589 in 1924; and the actual number of deaths declined to 477, in 1925, from 595 in 1924. It is thus obvious that while smallpox was considerably less prevalent in 1925, the type which prevailed was more virulent—as shown by the higher lethality. It will be observed that the case-fatality rate in 94 Canadian cities was approximately one-eleventh of that prevailing in 653 cities in the United States. In the following table we show the facts reported to us by health officials and registrars of the United States and Canada.

Smallpox Cases, Deaths, and Case-Fatality Rates for 747 Cities in the United States and Canada
1923-1925

AREA	1925			1924			1923		
	Cases	Deaths	Deaths per 100 Cases	Cases	Deaths	Deaths per 100 Cases	Cases	Deaths	Deaths per 100 Cases
United States and Canada(747 cities)	15,563	477	3.1	23,589	595	2.5	12,305	75	0.6
United States (653 cities).....	14,882	475	3.2	22,565	572	2.5	11,738	70	0.6
Canada (94 cities)..	681	2	0.3	1,024	23	2.2	567	5	0.9

The 1925 smallpox experience for certain cities is shown in the following table:

Smallpox Cases and Deaths in Certain Cities, 1925

City	Cases	Deaths	Deaths per 100 Cases
Birmingham, Ala.	1,675	6	.35
Los Angeles, Calif.	1,278	16	1.25
San Francisco, Calif.	205	15	7.31
Washington, D. C.	59	20	33.89
Cedar Rapids, Ia.	71	14	19.71
Mason City, Ia.	85	4	4.70
Detroit, Mich.	66	12	18.18
Minneapolis, Minn.	416	144	34.61
St. Paul, Minn.	81	22	27.16
Camden, N. J.	108	43	39.81
Youngstown, Ohio	210	9	4.28
Philadelphia, Pa.	184	23	12.50
Austin, Texas	96	3	3.12
Milwaukee, Wis.	386	87	22.53
Chicago, Ill.	70	12	17.14

These cities are selected on account of either above-average prevalence of smallpox or of outstandingly high case-fatality rates. The names of five of them—Birmingham, Los Angeles, Detroit, Minneapolis, and Camden—appeared in a similar smallpox study published in the Statistical Bulletin of April, 1925. The name of one city, Los Angeles, has appeared in this table for six consecutive years either on account of above-average prevalence or high lethality.

The most important items in the above table are the very high case-fatality rates for Camden, New Jersey (39.8 per 100); Minneapolis (34.6); Washington (33.9); St. Paul (27.2); and Milwaukee (22.5). Very fortunately, the smallpox which prevailed in Birmingham and Los Angeles where the disease reached the greatest prevalence in 1925, was less virulent than that experienced in the other cities listed in the above table. If the Camden case-fatality rate had prevailed in Birmingham and Los Angeles (and it is only a matter of good fortune that it did not) we would have had 1,175 deaths from smallpox in these two cities alone, instead of 22—or nearly three times as many as occurred in this entire group of 15 cities.

Smallpox during the first five months of 1926 has not been quite so prevalent as during the corresponding period of last year. Nevertheless, there have been scattered outbreaks of more or less severity. Health officers still continue to encounter organized opposition to

their efforts to stamp out this disease through vaccination—the only known preventive of smallpox. Without thoroughgoing, *wholesale*, vaccination, there is little to prevent the spread of the virulent type of smallpox which prevailed last year in cities like Camden, Minneapolis, Washington, and others, to communities now unprotected against this loathsome and dangerous disease.

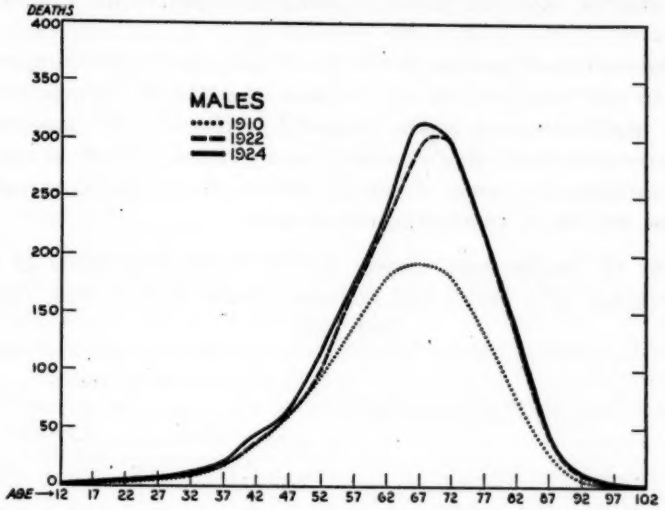
DEATHS FROM CANCER IN A LIFE TABLE POPULATION, 1924

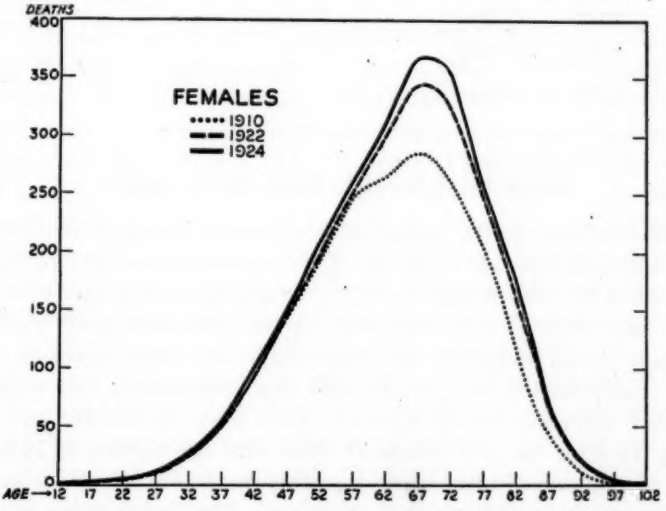
The probability that a boy or a girl, who has once reached the age of ten, will eventually die of cancer is still on the increase.

In the April, 1925, STATISTICAL BULLETIN we exhibited some charts and figures showing the increase in the number of cancer deaths at the several ages of life during the interval between 1910 and 1922, in a life table population, for the United States. We are now in a position to examine the continuation of the upward trend then observed. The table on page 8 shows the number of persons out of 100,000 entering the eleventh year of life (*i.e.*, ten years old), that die eventually of cancer, according to the mortalities of 1910, 1922 and 1924. The change per annum in these figures is also shown for the periods in question. It will be seen that the upward trend in the cancer deaths has continued during the two years for which data have become available since our last publication on this subject. In the case of males, while the annual increase persisted in 1922-1924 (141 per 100,000 entering the eleventh year of life), it was considerably less than in the period 1910-1922 (208 per 100,000 entering the eleventh year of life). In the case of females, on the other hand, the annual increase has been more than twice as great (319) in 1922-1924 as in the earlier period (123). Two years are, of course, an insufficient time to give an altogether reliable indication of the magnitude of the trend; nevertheless, the figures quoted may probably be taken as indicative, at least qualitatively, of the tendency prevailing to the present time.

The charts show in further detail the character of the change that has taken place from 1922 to 1924; the older data are also exhibited for comparison. The principal increment, 1922-1924, in the death toll occurred at the peak of the curve of deaths by age, that is, in the age group 65 to 70. Among males there is practically no change above this age group, and only a slight increase below it. Among females there is a definite, though slight, increase at all ages from 30 to 90, which barely shows in the chart on page 7.

CANCER DEATHS
IN A LIFE TABLE POPULATION
UNITED STATES 1910, 1922 AND 1924
AMONG 100,000 PERSONS STARTING TOGETHER AT AGE 10





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The figures computed for 1924 enable us to bring up to date, also, our estimate of the probability of dying from cancer. For a boy at age ten, the probability that he will eventually die of this disease was, under conditions of 1924, 8.7 per cent., as against 8.4 per cent. in 1922 and 5.9 per cent. in 1910; for a girl at the same age, the probability in 1924 was 12.0 per cent., as against 11.3 per cent. in 1922, and 9.9 per cent. in 1910. One out of every eight entering womanhood may be expected under present conditions to die ultimately of cancer.

This continued increase in the death toll from cancer brings once more to our attention one of the most regrettable features in the public health situation of the day, and emphasizes the importance of the research now being conducted in a number of medical centers to investigate the cause of cancer, with a view to working out an efficient method of combatting the disease.

Number of Deaths from Cancer in Life Table Population at and Above Age 10. Males and Females, United States 1910, 1922 and 1924

Year	Total Life Table Deaths in 100,000 Starting Together at Age 10		Annual Increase			
			Absolute		Per Cent.	
	Males	Females	Males	Females	Males	Females
1924	8,652	11,957	141	319	1.7	2.8
1922	8,370	11,320	208	123	3.5	1.2
1910	5,874	9,850				

HEALTH RECORD FOR MAY, 1926

The deathrate in the industrial populations of the United States and Canada during May (9.1 per 1,000) was substantially the same as reported for that month in 1925. Pronounced increases over last year's May figures were registered in the mortality from measles, whooping cough, influenza and pneumonia; but these increases were about compensated by lower rates for diphtheria, tuberculosis, diarrheal diseases and accidents. The May deathrate was the lowest recorded for any month of 1926, and the decline of 24.2 per cent. as compared with April is rather in excess of the seasonal drop expected at this time of the year. The outstanding factors

in the decline from the April figure were lower deathrates for influenza and pneumonia, the mortality from these diseases declining 57.8 per cent. and 43.2 per cent. respectively.

Although the measles rate dropped from 21.3 per 100,000 in April, to 16.6, in May, and the whooping cough figure from 15.4 to 11.0, the May rates are still inordinately high for these two maladies, which the average citizen is wont to regard as of minor importance when compared with diphtheria and scarlet fever. Present-day mortality statistics of these diseases of childhood present a striking contrast to those of a few years ago. In this connection comparison of the table on page 11 with a similar table for May, 1920, discloses a diphtheria rate of 16.2 per 100,000, which was much higher than the figure then shown for measles, and two and one-half times as high as the whooping cough deathrate then recorded, despite the fact that 1920 was a year of above-average mortality from both measles and whooping cough. In May, 1926, on the other hand, we find measles to be the leader among the diseases of childhood, causing approximately twice as many deaths as diphtheria. Whooping cough is now second in importance with a much higher deathrate than diphtheria and is charged with three and one-half deaths to every one from scarlet fever. While it is true that 1926, to date, has been a year of above-average prevalence of measles and whooping cough, it bids fair to mark a new minimum deathrate for what has always been the most dreaded of the diseases of childhood, that is, diphtheria.

Tuberculosis mortality registered a marked decline as compared with April with a smaller drop from its May, 1925, figure. The rates for the principal "degenerative diseases"—organic heart disease, Bright's disease and cerebral hemorrhage—were about the same as at this time last year; but all three recorded greatly reduced rates as compared with April. This latter development was to be expected in view of the pronounced declines in the mortality from influenza and pneumonia, which, when they are running high, always hasten the deaths of many persons suffering from chronic ailments.

Among deaths due to violence, suicides were much more frequent than in May a year ago; while homicides were fewer than in 1925, and in April of this year. Accidents, as a group, registered about the same rate as for April with a slight decline over May of last year. Automobile fatalities showed the usual seasonal rise over the April, 1926, figure and the rate was also higher than in May, 1925.

The general deathrate for the large cities of the United States in

May was 13.7 per 1,000 population. This was much lower than for the previous month (16.6) but exceeded that for May, 1925 (13.0). Malaria, measles, smallpox, typhoid fever and whooping cough were more prevalent in May than in April, but there were fewer cases of diphtheria, influenza, poliomyelitis and scarlet fever. Comparison with May of last year shows more cases of influenza, malaria, measles, scarlet fever and whooping cough with lower incidence of diphtheria, poliomyelitis, smallpox and typhoid fever.

No outstanding outbreaks of diphtheria were reported during May, but there was unusually high prevalence of scarlet fever in two small communities—Wapokoneta, Ohio and Moore Park, Manitoba.

Influenza cases are falling off rapidly, the most pronounced declines being reported from Alabama, Arkansas and Wisconsin.

Measles continued to increase in May in most of the states tabulated. In California 1,219 cases were reported for the first three weeks of May as compared with 505 during the same weeks of April. In Illinois, the corresponding increase was from 2,724 to 3,414. In Toledo, Ohio, drastic measures were ordered to combat a measles outbreak. Children under fifteen were held quarantined in every home where measles was discovered even if they had previously suffered from the disease.

Smallpox was somewhat more prevalent in May than in April. Nevertheless, the states where the smallpox situation was most serious earlier in the year, reported a decrease. In California, for example, there were 105 cases reported for the first three weeks of May against 272 for the corresponding weeks of April, and in Florida there were only 221, against 401. Texas, however, reported an increase from 171 cases in April to 381 in May.

Among the health activities of the month the following may be mentioned. The first American Health Congress under the auspices of the National Health Council, met at Atlantic City, New Jersey. The Congress brought together all the national health organizations with a view to getting a better understanding of each others' problems and specialities. At the meeting of the Texas State Medical Association, maps were displayed showing the progress of state-wide milk sanitation. About a score of Texas cities have passed the "Standard Milk Ordinance" recommended by the United States Public Health Service. In Toledo, Ohio, three antitoxin dispensing stations were incorporated. These were kept open all night during the recent high prevalence of diphtheria in that city.

The following table shows the mortality among Industrial policyholders for May, 1926; April, 1926; May, 1925 and for the year 1925.

METROPOLITAN LIFE INSURANCE COMPANY

Deathrates* per 100,000 for Principal Causes, Premium-paying Business in Industrial Department (Annual Basis)

MONTHS OF APRIL, 1926; MAY, 1926, AND OF MAY, 1925

CAUSES OF DEATH	RATE PER 100,000 LIVES EXPOSED*			
	May, 1926	Apr., 1926	May, 1925	Year 1925†
TOTAL—ALL CAUSES	913.8	1199.4	901.1	906.9
Typhoid fever	1.8	2.5	2.0	4.6
Measles	16.6	21.3	5.1	3.3
Scarlet fever	3.4	5.1	4.7	3.5
Whooping cough	11.0	15.4	8.1	7.7
Diphtheria	8.6	9.0	10.6	10.6
Influenza	38.5	91.3	25.5	21.9
Tuberculosis (all forms)	98.8	114.9	104.5	98.0
Tuberculosis of resp'y system	86.4	99.5	89.3	85.8
Cancer	65.5	77.1	67.2	70.5
Diabetes mellitus	14.0	20.1	14.4	15.2
Cerebral hemorrhage	50.2	61.3	50.6	53.5
Organic diseases of heart	126.6	171.8	126.7	126.6
Pneumonia (all forms)	108.4	191.0	96.5	86.5
Other respiratory diseases	12.5	19.6	14.5	13.3
Diarrhea and enteritis	15.4	17.8	19.4	36.6
Bright's disease (chronic nephritis)	69.6	82.6	68.0	69.8
Puerperal state	15.2	17.9	15.7	16.5
Suicides	7.8	7.6	5.4	6.9
Homicides	5.9	7.6	6.9	7.2
Other external causes (excluding suicides and homicides)	53.6	53.1	56.7	64.2
Traumatism by automobiles	14.9	13.5	14.4	16.5
All other causes	190.6	212.6	198.8	190.5

*All figures include infants insured under one year of age.
†Based on provisional estimate of lives exposed to risk in 1925.

Correspondence on the subjects discussed in these BULLETINS may be addressed to: The Editor.

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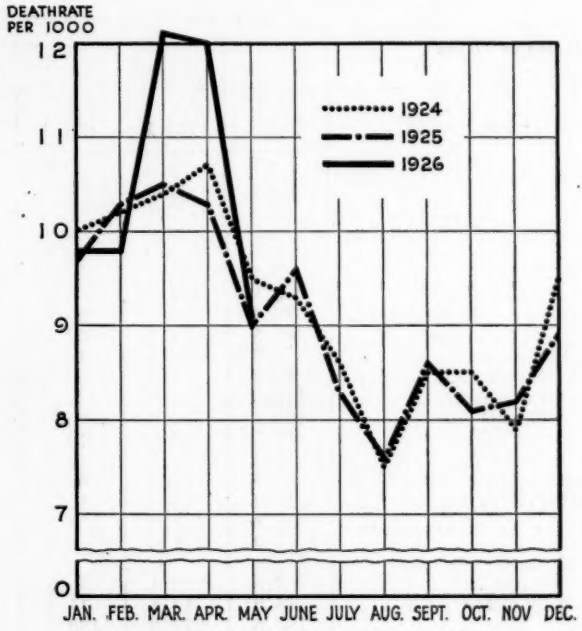
Metropolitan Life Insurance Company,
1 Madison Avenue, New York City.

DEATHRATE PER 1000
in SPECIFIED MONTHS of
1924, 1925, 1926

METROPOLITAN LIFE INSURANCE COMPANY
INDUSTRIAL DEPARTMENT
(ANNUAL BASIS)



	1924	1925	1926		1924	1925	1926
JAN.	10.0	9.7	9.8	JULY	8.6	8.3	
FEB.	10.2	10.3	9.8	AUG.	7.5	7.6	
MAR.	10.4	10.5	12.1	SEPT.	8.5	8.6	
APR.	10.7	10.3	12.0	OCT.	8.5	8.1	
MAY	9.5	9.0	9.1	NOV.	7.9	8.2	
JUNE	9.3	9.6		DEC.	9.5	8.9	

NOTE: Figures include mortality of infants under one year of age.

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